Characterization of atmospheric aerosols by deriving lidar ratio profiles at a tropical inland station Gadanki, Tirupati, India

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Knowledge of the vertical distribution of atmospheric aerosols and their optical properties is important for determining the direct and indirect radiative forcing of aerosols. Lidar is a useful instrument that can measure vertical distribution of extinction/ backscattering coefficient of aerosols. The retrieval of aerosol extinction/ backscattering profile from single wavelength lidar measurements is complicated by the fact that the lidar equation contains two unknown, namely the backscattering coefficient and extinction coefficient. It has been common practice to assume that these parameters are related in the form of the extinction-to-backscatter ratio or lidar ratio (LR). LR depends on several factors such as aerosol size, shape, refractive index and relative humidity. In the present work we report on the characteristics of aerosol optical properties of aerosols in the summer and winter seasons of the year 2007 at a tropical inland station Gadanki (13.5^0N, 79.2^0E), Tirupati, India using range dependent lidar ratio. The vertical distribution of the aerosol lidar ratio in the lower stratosphere shows large variability during this observation period. We have investigated the possible reasons for this variability by studying the troposphere stratosphere interactions and air mass back trajectory calculations to identify the sources of the observed aerosols at this location.